

December 11, 2018

Ms. Natalie Maupin, Pretreatment Coordinator  
Indiana Department of Environmental Management  
Office of Water Quality, Compliance Branch  
100 N. Senate Ave., ICGN 1255  
Indianapolis, IN 46204

Mr. Newton Ellens, Pretreatment Program Manager  
U.S. Environmental Protection Agency Region 5  
Water Division  
77 W. Jackson Blvd., Mail Code WC-15J  
Chicago, IL 60604-3507

Dear Ms. Maupin and Mr. Ellens,

Transmit via FedEx #

As you may know, Safety-Kleen Systems, Inc. (SK) has been working with the East Chicago Sanitary District (ECSD) to resolve alleged cyanide exceedances in the wastewater discharge. This letter is intended to communicate the extensive efforts taken by the company to address this issue.

SK efforts and investment to comply with permit discharge limits are described in this letter and support our position that the recent limit of 3 ppb, and the current limit of 19 ppb, are not technically achievable.

Since 2007, when the waste water permit limit was reduced from 407 ppb total cyanide to 3 ppb amenable cyanide, Safety-Kleen has invested significant time and expense in determining a solution. Efforts to reduce cyanide commenced immediately and began by conducting research with established waste water treatment experts. That year, Ashland Chemical conducted bench and field testing using chlorine dioxide. Those tests were inconclusive and Safety-Kleen pursued other options.

In 2008, McMahon & Associates conducted treatment studies using hydrogen peroxide. The tests showed promise, and in 2010, Safety-Kleen started operation of a pilot system that introduced H<sub>2</sub>O<sub>2</sub> into the waste water stream after the clarifier. The system was operated by US Peroxide from 2010 until 2013, when it was removed from service after it was found to be ineffective.

In 2010, Ramboll Environ was commissioned by Safety-Kleen to study the waste water treatment facility, perform comparative analyses with cyanide treatment at other locations, and provide options. Recommendations were identified over the course of five years, and included increasing equalization capacity, optimizing biological treatment, optimizing chemical oxidation, and evaluating the effectiveness of a final treatment step. Environ also identified concerns with analytical methods, which were shared with ECSD as part of efforts to solve a collective compliance challenge.

Recommendations from Ramboll formed the basis for Safety-Kleen's efforts that have led to significant improvements in reducing cyanide levels. Over the past year, Safety-Kleen has successfully reduced the concentration of cyanide in its process by > 90%. This reduction is measured against concentrations provided by ECSD in 2015 with three alleged exceedances over 1,000 ppb. The reduction is the result of extensive research and development into biological and chemical treatment options and infrastructure investment.

Safety-Kleen is also utilizing two biological treatment tanks to reduce cyanide. These tanks reduce cyanide concentration by >95%. In 2012 the tanks were modified to operate with higher levels, which increased capacity by 23%. In 2017, one of the tanks was removed from service, cleaned, and repaired. The repair scope included rebuilding the air distribution grid. Since placing back online, overall biological activity is improved. The second biological tank is scheduled for similar cleaning and inspection in 2019. Cyanide reduction in these tanks has been improved by increasing air flow and operating temperature, and reducing total suspended solids.

River Bend Labs completed a study of biological activity effectiveness in July 2018. The results of that study found that bio activity could be increased by providing supplemental micronutrients to the treatment tanks, which could reduce cyanide and CODs. SK initiated the supplement trial in October 2018 and expects to have results by December 2018.

Safety-Kleen has invested approximately \$650,000 of capital into upgrading the waste water system. In March 2016, Safety-Kleen placed a new Feed Equalization Tank into service. This new tank has a 600,000 gallon capacity and is nearly three times larger than its predecessor. The sizing of the tank was based on the ability to handle 4" of rain, equivalent to the water surge from a 10-year, 24-hour rainfall event, based on data from the US Department of Agriculture. Due to the large size, this tank has provided additional system capacity to maintain consistent waste water feed rates through significant rain events. The improved system capacity has also reduced overall system variability, which permits more consistent and effective water treatment.

A pilot chemical treatment system was installed and placed online in August 2017. The system, installed after the biological system and clarifier, uses peroxide and a series of reagent chemicals that break down the cyanide complex. The chemical supplier, CCI, was selected after a vetting process involving numerous other technology providers who offered options including full oxidation with chlorine dioxide and peroxide, carbon filtration, alkaline chlorination, ozone, and ultraviolet radiation. The evaluation of those technology providers spanned from June 2016 to February 2017. Several companies refused to engage in preliminary study, believing the 3 ppb limit was unachievable. Ultimately, the process offered by CCI proved the most promising after a period of bench trials and testing. CCI is an industry leader in waste water treatment, and specializes in cyanide reduction in the mining industry. CCI has also been effective in assisting Safety-Kleen's facility in Newark, California to consistently meet the 0.65 ppm cyanide permit limit. After one year of field data, the system has proven to reduce cyanide concentration from the clarifier effluent by an average of 56%.



The current pilot system replaces the prior breakpoint treatment process, which had been in place since 2009. At the time, waste water consultants believed increasing the pH of the waste water stream by using bleach could break down the cyanide complex. Waste water pH was then returned to permit limit range by using a dechlorination agent. Testing in 2016 found this process could increase cyanide concentration, and the process was discontinued.

Study into the waste water process identified a number of opportunities to reduce cyanide concentration upstream of the chemical treatment system. The primary source of cyanide in the re-refining process is condensate generated by steam-driven vacuum ejectors, which has a concentration that can exceed 40,000 ppb. Safety-Kleen has evaluated two pre-treatment options. The first involved re-routing the condensate stream to a distillation tower. This process change was attempted from June through December 2016. While the process change was effective in reducing cyanide concentration, it also increased ammonia concentration in the waste water stream. The condensate stream was returned to pre-test conditions to prevent ammonia exceedances, and because the reduction of cyanide was insufficient to justify continuing the experiment.

The second pre-treatment option started in June 2018 and is currently in use. Ejector condensate is currently routed to a series of tanks, in which a batch process involving heat, pH adjustment, and chemical treatment is completed prior to processing through the waste water plant. The batch process, though not as effective as pre-treatment through the above-mentioned distillation tower, has successfully reduced overall system concentration and variability without affecting other waste water characteristics.

SK has evaluated shipping the condensate generated by steam-driven vacuum ejectors offsite for disposal. This option is not practicable for two reasons. The first reason is safety. Logistically, this would require shipment of five trailers on a daily basis. These additional over the road shipments would add an element of risk that is not necessary if ECSD were to allocate cyanide as suggested. The second reason is cost. To ship this water off-site for disposal would cost approximately \$12,900,000 per year.

In February 2018, Safety-Kleen purchased an instrument to measure cyanide without using an outside laboratory. This instrument measures cyanide using the same USEPA Method OIA-1677 as commercial labs used by ECSD. Procurement of the instrument, along with all necessary validation tests, procedure development, and detection limit studies have enabled Safety-Kleen to greatly expand its ability to measure cyanide throughout its process and receive same-day results. Samples are taken only from process monitoring points, not at the effluent point.

Process data measurements show cyanide concentration has reached a consistent range, which could indicate the remaining cyanide complex is not amenable to treatment and/or there remain analytical measurement challenges.

When the cyanide limit was established in East Chicago Ordinance 13.13.3.02.3, the measurement method was specified as 4500-CN-G (CATC). This method was recognized by industrial waste water experts to have low accuracy and precision ratings. ECSD recognized challenges with CATC and proposed IOIA-1677 as the permit limit method.

While OIA-1677 is an improvement, results still have a wide variability. The method itself establishes quality control acceptance criteria for ongoing precision and recovery of between 82 and 132 percent, and instrument and operator variability can introduce additional error. In 2016, Safety-Kleen performed a repeatability study on the OIA-1677 method. On three occasions, split samples from clarifier effluent were divided into 10 samples each sent to ALS and Microbac. Results shown below demonstrate the commercial labs have significantly different averages and variabilities, with Microbac having a higher average and standard deviation than ALS.

<b>Summary Statistics - 1677 Repeatability Study</b>				
All results in ppb	<b>Range (min - max)</b>		<b>Avg</b>	<b>StDev</b>
<b>ALS #1</b>	176	232	210.3	18.1
<b>ALS #2</b>	171	250	186.5	21.6
<b>ALS #3</b>	173	199	183.6	8.1
<b>ALS Summary</b>	171	250	193.5	20.7
<b>Microbac #1</b>	151	170	161.7	4.9
<b>Microbac #2</b>	180	241	219.7	14.8
<b>Microbac #3</b>	215	235	226.2	6.9
<b>Microbac Summary</b>	151	241	202.5	30.6

Safety-Kleen remains committed to its responsibilities as a good corporate neighbor. To date, Safety-Kleen has invested over \$2,000,000 that includes infrastructure improvements, consulting services, increased chemical treatment costs (\$400,000/year), and continues to evaluate technical options for opportunities to improve the waste water process.

While efforts to reduce cyanide continue in earnest, Safety-Kleen believes it has reached the limit of technology currently available. EPA guidance allows POTWs to consider treatability in determining an allocation, and also recommends a "Common Sense Assessment" of the local limits resulting from the chosen allocation method that considers whether the limits are technically achievable. EPA Local Limits Development Guidance (EPA 833-R-04-002A, July 2004), pp 6-10 to 6-14. This assessment recommends that POTWs ask whether industrial users are "likely to meet these limits with currently available forms of pretreatment and pollution prevention (e.g., process modifications)." As described above, Safety-Kleen has explored the range of currently available forms of pretreatment and pollution prevention, but is unlikely to meet the limits resulting from the uniform allocation method adopted by ECSD.

Therefore, Safety-Kleen has requested that ECSD consider the Contributory Flow or Mass Proportion method to develop a revised allocation for cyanide. Please refer to Attachment 1 for a copy of that request. Such an allocation is within ECSD's authority, would fully protect the POTW and the



environment, and would provide a viable pretreatment permit containing discharge limits that Safety-Kleen could meet with currently available forms of pretreatment and pollution prevention.

ECSD proposes to apply the 19 ppb limit uniformly across all industrial users, independent of current cyanide contributions to the system. ECSD's reason why this approach was taken is they did not want to give any industrial user an "economic advantage".

Under the pretreatment regulations, ECSD can allocate the local cyanide limit using a mass- or flow-based approach. SK does not believe using this approach gives anyone an economic advantage. This simply allows industrial users who generate cyanide to discharge treated water in compliance with federal and state regulations and allows both ECSD and SK to comply with the respective NPDES/discharge permits.

Flow allocation options per regulation are summarized below – All keep ECSD compliant with NPDES permit and total allowable industrial POTW headworks loading of 0.43 lb/day

- 19 ppb            Every user has same limit
- 184 ppb        Based on volume flow across all users
- 309 ppb        Based on users' long-term average flow

All method options are recognized by EPA and used by other POTW's.

Adjustment of the SK cyanide discharge limit will have no effect on ECSD's ability to comply with its NPDES permit, so would satisfy the purpose of local limits, which are intended to protect the POTW and the environment.

We would appreciate the opportunity to schedule meetings with both EPA and IDEM to further discuss SK's efforts and a path forward to ensure compliance.

Sincerely,



Jason R. Shoff  
Director, Facility Operations

cc Erika Powers, Barnes & Thornburg LLP  
Mr. Joseph Allegretti  
Dr. Abdul Zehraoui  
Mayor Anthony Copeland

ATTACHMENT 1

SK letter to ECSD dated September 11, 2018

September 11, 2018

Dr. Abdul Zehraoui  
Director of Utilities  
East Chicago Sanitary District  
5200 Indianapolis Blvd.  
East Chicago, IN 46312

Dear Dr. Zehraoui,

This letter is intended to provide an update of Safety-Kleen's efforts and investment to comply with permit discharge limits, and support our position that the current limit of 3 ppb, and the proposed limit of 19 ppb are not technically achievable. These topics were presented to Mr. Allegretti and Mr. El Harit on July 24, 2018.

Since 2007 when the waste water permit limit was reduced from 407 ppb total cyanide to 3 ppb amenable cyanide, Safety-Kleen has invested significant time and expense in determining a solution. That year, Ashland Chemical conducted bench and field testing using chlorine dioxide. Those tests were inconclusive and Safety-Kleen pursued other options.

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Over the past year, Safety-Kleen has successfully reduced the concentration of cyanide in its process by > 90%. This reduction is measured against concentrations provided by ECSD in 2015 with three alleged exceedances over 1,000 ppb. The latest alleged exceedance reported on June 13 was 78 ppb. The reduction is the result of extensive research and development into biological and chemical treatment options and infrastructure investment.

A pilot system chemical treatment system was installed and placed online in August 2017. The system, installed after the biological system and clarifier, uses peroxide and a series of reagent chemicals that break down the cyanide complex. The chemical supplier, CCI, was selected after a vetting process involving numerous other technology providers who offered options including full oxidation with



chlorine dioxide and peroxide, carbon filtration, alkaline chlorination, ozone, and ultraviolet radiation. The evaluation of those technology providers spanned from June 2016 to February 2017. Several companies refused to engage in preliminary study, believing the 3 ppb limit was unachievable. Ultimately, the process offered by CCI proved the most promising after a period of bench trials and testing. CCI is an industry leader in waste water treatment, and specializes in cyanide reduction in the mining industry. CCI has also been effective in assisting Safety-Kleen's facility in Newark, California to consistently meet its own cyanide permit limits. After one year of field data, the system has proven to reduce cyanide concentration from the clarifier effluent by an average of 56%.

The current pilot system replaces the prior breakpoint treatment process, which had been in place since 2009. At the time, waste water consultants believed increasing the pH of the waste water stream by using bleach could break down the cyanide complex. Waste water pH was then returned to permit limit range by using a dechlorination agent. Testing in 2016 found this process could increase cyanide concentration, and the process was discontinued.

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Safety-Kleen has invested approximately \$650,000 of capital into upgrading the waste water system. In March 2016, Safety-Kleen placed a new Feed Equalization Tank into service. This new tank has a 600,000 gallon capacity and is nearly three times larger than its predecessor. The sizing of the tank was based on the ability to handle 4" of rain, equivalent to the water surge from a 10-year, 24-hour rainfall event, based on data from the US Department of Agriculture. Due to the large size, this tank has provided



additional system capacity to maintain consistent waste water feed rates through significant rain events. The improved system capacitance has also reduced overall system variability, which permits more consistent and effective water treatment.

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While OIA-1677 is an improvement, results still have a wide variability. The method itself recognizes a recover range from 82-132%, and instrument and operator variability can introduce additional error. In 2016, Safety-Kleen performed a repeatability study on the OIA-1677 method. On three occasions, split samples from clarifier effluent were divided into 10 samples each sent to ALS and Microbac. Results shown below demonstrate the commercial labs have significantly different averages and variabilities, with Microbac having a higher average and standard deviation than ALS.

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Microbac #3	215	235	226.2	6.9
<b>Microbac Summary</b>	151	241	202.5	30.6

As discussed during the July 24 meeting, Safety-Kleen remains committed to its responsibilities as a good corporate neighbor. To date, Safety-Kleen has invested over \$300,000 in consulting services, increased

chemical treatment costs from \$90,000/year to \$400,000/year, and continues to evaluate technical options for opportunities to improve the waste water process.

While efforts to reduce cyanide continue in earnest, Safety-Kleen believes it has approached the limit of technology currently available. Safety-Kleen requests ECSD consider the Contributory Flow or Mass Proportion method to develop a revised allocation for cyanide. Such an allocation is fully within ECSD's authority, and is necessary as Safety-Kleen cannot meet the proposed 19 ppb limit from the uniform allocation method.

Best regards,



Jason R. Shoff  
Director, Facility Operations

cc Erika Powers, Barnes & Thornburg LLP  
Mr. Joseph Allegretti